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In re the Application of:

Katsumi MIYATA et al.

Serial Number: **09/478,508**

Group Art Unit: **2814**

Filed: **January 6, 2000**

Examiner: **GRAYBILL, D.**

For: **SEMICONDUCTOR DEVICE AND METHOD OF MANUFACTURING THE SAME**

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Date: April 3, 2002

Dear Sir:

Please amend the above identified application as follows:

IN THE CLAIMS:

Please **AMEND** claim 16 as follows:

1 16. (Amended) A semiconductor device having a semiconductor chip,
2 first electrodes formed on said semiconductor chip,
3 barrier metals formed on said first electrodes and having laminated structures, and
4 a plurality of second protruded electrodes, which serve as external connection terminals,
5 formed on said barrier metals, wherein said barrier metals comprising:
6 a lowermost conductive metal layer laminated on said first electrodes, said lowermost
7 conductive metal layer having a joining property with said first electrodes;

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an intermediate conductive metal layer laminated on said lowermost conductive metal layer, said intermediate conductive metal layer being made of nickel (Ni); and an uppermost conductive metal layer laminated on said one or more intermediate conductive metal layers, said uppermost conductive metal layer being made of a material which easily alloys with the material of said intermediate conductive metal layers and which has resistance to oxidation, said uppermost conductive metal layer being made of a metal selected from the group consisting of gold (Au), platinum (Pt), palladium (Pd), silver (Ag) and rhodium (Rh) or of an alloy containing a metal selected from the group consisting of gold (Au), platinum (Pt), palladium (Pd), silver (Ag) and rhodium (Rh).

REMARKS

Claims 16 and 17 are pending in this application. Reconsideration of the rejections in view of these amendments and the following remarks is respectfully requested.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment, which is captioned "Version with Markings to Show Changes Made."

Rejections under 35 USC §102(b)

Claim 16 was rejected under 35 USC §102(b) as being anticipated by Cook (U.S. Patent No. 5,719,070).

Claim 16 has been amended to recite the materials forming the barrier metal. Amended claim 16 patentability distinguishes over Cook.

Cook merely discloses a normal barrier metal known in the art. In Cook, the barrier metal serves to improve a joining property against solder and to prevent the solder from being diffused. The barrier metal is formed and then the solder bump is formed. Then, a probe test is performed by contacting a probe with the solder bump. However, Cook does not teach that the probe test is performed on the barrier metal.

If a normal barrier metal such as the one known from Cook is used for a method in which a probe test is performed before forming the solder bump, the barrier metal will be oxidized during the probe test. This should be avoided because it is difficult to form the solder bump on the oxidized barrier metal.

On the other hand, claim 16 of the present application recites “an **intermediate conductive metal layer** laminated on said lowermost conductive metal layer, said intermediate conductive metal layer being **made of nickel (Ni)**; and an **uppermost conductive metal layer** laminated on said one or more intermediate conductive metal layers, said uppermost conductive metal layer being made of a material which easily alloys with the material of said intermediate conductive metal layers and which has resistance to oxidation, said uppermost conductive metal layer being **made of a metal selected from the group consisting of gold (Au), platinum (Pt), palladium (Pd), silver (Ag) and rhodium (Rh) or of an alloy containing a metal selected from the group consisting of gold (Au), platinum (Pt), palladium (Pd), silver (Ag) and rhodium (Rh)**.” Cook does not teach or suggest such features as recited in claim 16.

For at least these reasons, claim 16 patentably distinguishes over Cook. Claim 17, depending from claim 16, also patentably distinguishes over Cook for at least the same reasons.

It is submitted that all claims of the present invention patentably distinguish over the cited references. Thus, all pending claims are in condition for allowance. Reconsideration of the rejections, withdrawal of the rejections and an early issue of a Notice of Allowance are earnestly solicited.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicant's undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicant respectfully petitions for an appropriate extension of time. The fees for such an extension or any other fees which may be due with respect to this paper, may be charged to Deposit Account No. 01-2340.

Respectfully submitted,

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